

AMENDMENT TO THE SPECIFICATION

Please amend paragraph [0006] as follows:

[0006] In the above-mentioned example, it is previously known what the orientation of the items, and therefore the tags, will be. A common type of interrogator includes an antenna that transmits a signal that is predominantly linearly polarized, with this polarization oriented in a single direction. A tag will have an optimum orientation of its antenna to this polarized signal. If a tag happens to be positioned with its antenna at a ninety-degree angle relative to this optimum orientation, the communication range might only be one-twentieth the range of a properly aligned tag. As a result, when the orientation of items passing the interrogator is not known, the tags that are not aligned with the polarization of the interrogator may not be read. Some interrogators include an antenna that transmits a circularly polarized signal. However, to generate this circularly polarized signal, the strength of the outputted EM wave is significantly reduced. Other interrogators include two antennas; one to transmit horizontally polarized signals, and another to transmit vertically polarized signals. However adding the second antenna not only increases the ~~complexity~~ complexity and cost of the interrogator, but also the size. What is needed is a simple and compact interrogator for reading RFID tags of differing orientations.

Please amend paragraph [0020] as follows:

[0020] **Figures 2A and 2B** illustrate an aperture patch antenna according to a first embodiment of the invention. The aperture patch antenna may be the antenna 28 described above. The aperture patch antenna 100 includes a ground plane 102 and a patch 104. The patch 104 is suspended above the ground plane 102, as can be seen in the cross sectional view in **Figure 2B**. According to this embodiment, the ground plane 102 and patch 104 are physically connected through an insulator such as a plastic support 106. The ground plane 102 includes an aperture 108 formed in it. The aperture

108 creates an electric field when either of the strip lines 110a and 100b is activated. The electric field propagates a wave, which is transmitted by the patch 104. The aperture 108, as shown here, is in the shape of a cross. It is understood that other aperture shapes may be used according to the needs of the application.

Please amend paragraph **[0021]** as follows:

[0021] The two strip lines 110a and 110b may be activated to propagate either a horizontally or a vertically polarized wave. Depending on the orientation of the antenna 100, when the strip line 110a is activated, the output of the patch 104 may be a horizontally polarized wave, and when the strip line 110b is activated, the output of the patch 104 may be a vertically polarized wave. The strip lines 110 may be alternately activated using a switch 112. The switch 112 may be the switch 26 shown above. When the interrogator is searching for RFID tags, the switch 112 may rapidly alternate between activating the ~~switch~~ strip lines 110a and 110b. By doing this, the interrogator 10 will alternately transmit horizontally and vertically polarized signals, which can be used to identify items, such as items in boxes that are typically alternately horizontally or vertically placed. For example, if a conveyer belt moves several items past a fixed interrogator, the interrogator will be able to read tags that are both horizontally and vertically oriented.

Please amend paragraph **[0022]** as follows:

[0022] According to an embodiment of the invention, the ground plane 102 has a nominal side length of 6.5 inches, and the length may range between 1 inch and 18 inches, depending on application. The patch may have a nominal side length of 4.25 inches, the length ranging between 0.5 inches and 12 inches. The width of the strip lines 110a and 110b may nominally be 0.1875 inches, ranging between 0.03125 inches and 1 inch. The separation between the ground plane 102 and the patch 104 is nominally 0.5625 inches, ranging between 0.25 inches and 5 inches. Each arm of the

aperture 108 may be nominally 0.25 inches wide and 3.25 inches long. These dimensions may be used to create the antenna 28 to be used with the RFID interrogator 10, according to one embodiment of the invention.

Please amend paragraph [0026] as follows:

[0026] As mentioned above, the switch 208 may be rapidly alternated to switch between horizontal and vertical polarization. For example, the switch 208 may drive the ~~input-strip~~ line 206a to transmit a vertically polarized signal and drive the strip line 208b 206b to transmit a horizontally polarized signal. The switch 208 will only transmit one of a horizontal or vertical signal at a time, thereby driving the full signal strength in one orientation. In this way, each signal is still transmitted at full strength, while the interrogator is able to transmit signals having a different polarization using a single antenna.

Please amend paragraph [0028] as follows:

[0028] The switch 310, like the switches 208 and 112, can rapidly alternate between activating the two strip lines 306a and 306b. Alternating between the strip lines 306a and 306b will alternate between transmitted signals having horizontal polarization and signals having vertical polarization. Like mentioned before, this ability allows the antenna 300 to quickly and easily scan items that are typically in a horizontal or vertical position, such as boxes located on a conveyer belt. Implementing this functionality in a single antenna 300 reduces the complexity and cost of the interrogator, as well as ~~reducing-reduces~~ the size of the interrogator.

Please amend paragraph [0029] as follows:

[0029] **Figures 5A and 5B** illustrate a patch antenna according to a fourth embodiment of the present invention. **Figure 5A** illustrates an overhead view of a patch

antenna 400 that has strip lines connected along the diagonals of the patch. **Figure 5B** illustrates a cross sectional view of the patch antenna 400. The patch antenna 400 includes a patch 402, a ground plane 404, and two strip lines 406a and 406b. The strip lines 406a and 406b are connected with the patch 402 at points located along diagonals 408a and 408b of the patch 402. As mentioned above with regard to the patch antenna 300, the strip lines 406a and 406b may be connected to the patch 402 anywhere along the lines 408a and 408b depending on the frequency and other requirements of the specific interrogator 10 in which the patch antenna 400 will be used. A switch 410 can rapidly alternate between the two strip lines 406a and 406b, thereby alternating between a vertically and horizontally polarized signal. As mentioned above, this allows the interrogator to quickly read several tags which may have varying horizontal or vertical orientations.

Please amend paragraph [0035] as follows:

[0035] If it is determined that there is an RFID tag present ~~in block 506~~, the identity of the tag is determined in block 506 using well known methods. It is understood that other information besides the identity of the tag may also be transmitted by the tag. In block 508, it is determined whether the interrogator is done searching. For example, the interrogator may only be searching for a single tag, and once the tag is found, the process 500 should be finished. If the interrogator has finished searching, the process 500 ends. If the interrogator is not done searching, the process can return to block 502 and another horizontally polarized signal may be generated, or alternately the process may continue to block 510 where a vertically polarized signal is generated.

Please amend paragraph [0036] as follows:

[0036] If no RFID tag is found in block 504, the process 500 continues to block 510. According to one embodiment, the interrogator may continue to propagate horizontally polarized signals for a predetermined period of time, after which the process

will continue in to block 510. In block 510, the position of the switches 112, 208 or etc. has changed to such that a second strip line is activated. The second strip line here will transmit a vertically polarized signal when it is activated. However, it is understood the configuration of the first and second strip line may be reversed. In block 512, it is determined whether there is a RFID tag present. If there is an RFID tag present, the process continues to block 506 where the identity of the tag is determined. If there is no RFID tag found, the process continues to block 508, where it is queried whether the interrogator is done searching. If the interrogator is done searching, the process 500 finishes. If not, the process may return to block 502.